

## Dimensionally Stable Structural Space Cable, Phase I

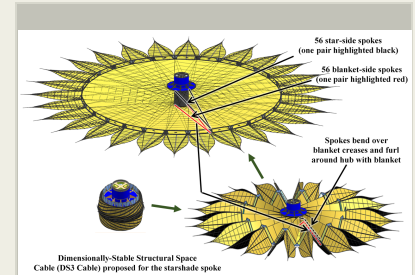
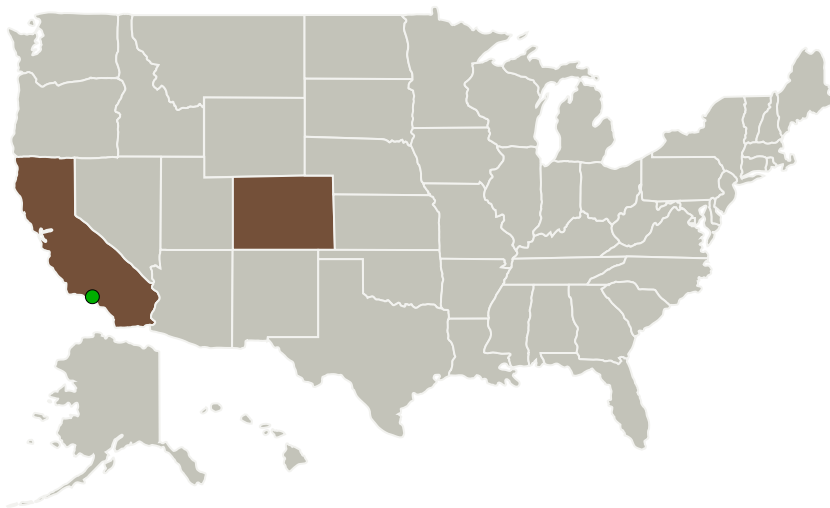
Completed Technology Project (2015 - 2015)



## Project Introduction

In response to the need for an affordable exoplanet-analysis science mission, NASA has recently embarked on the ROSES Technology Development for Exoplanet Missions (TDEM) program to develop a large deployable starshade (external occulter) with adequate manufacturing, deployment precision and stability. To that end NASA-JPL is involved in an ongoing effort to design and demonstrate a full-scale (30-32m diameter) starshade which utilizes a radially deploying and optically precise perimeter truss with 28 circumferentially mounted petals. The perimeter truss structure deploys from an initial diameter of 3 m to 20 m and is configured much like a bicycle wheel when deployed in that the only components connecting the center structural hub to the perimeter truss are a series of spokes, which largely determine the deployed shape of the ring truss and petals. In addition the spoke component must also bend and fold to a tight radius upon packaging for launch. Although high performance carbon fiber cable has been used for space applications in the past, there are no commercially available cable products with the specifications necessary for this starshade application. To meet the needs of the starshade system, Roccor proposes to develop a Dimensionally-Stable Structural Space Cable (DS3 Cable) consisting of advanced fibers that enable linear and consistent behavior at very low operational tensions as well as a near-zero coefficient of thermal expansion (CTE). This work will also address feasibility concerns with manufacturing consistency and package-ability by fabricating a large quantity of test articles for evaluation at JPL. The DS3 cable is widely applicable to many variants of precision space deployable structures and will be made commercially available for alternative uses.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Roccor, LLC	Lead Organization	Industry	Longmont, Colorado
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Colorado

## Project Transitions

▶ **June 2015:** Project Start

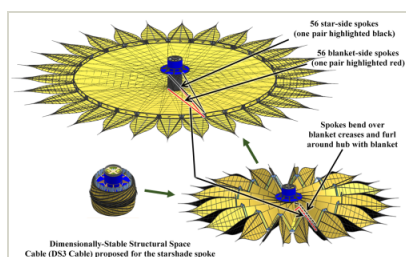
✓ **December 2015:** Closed out

**Closeout Summary:** Dimensionally Stable Structural Space Cable, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138808>)

## Images



**Briefing Chart Image**

Dimensionally Stable Structural Space Cable, Phase I  
(<https://techport.nasa.gov/image/130950>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Roccor, LLC

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Bruce Davis

**Co-Investigator:**

Bruce L Davis

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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.2 Observatories
    - └ TX08.2.2 Structures and Antennas

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System